

ABSTRACT

Numerous methods for forming various semiconductor structures are disclosed. In one embodiment, a layered dielectric structure of alternating sub-layers of a first dielectric material and a second dielectric material is formed on a suitable semiconductor substrate. In this embodiment, the layered dielectric structure comprises an alternating pattern of at least two sub-layers of a first dielectric material which is a high-K dielectric material and at least one layer of a second dielectric material which is a standard-K dielectric material, wherein at least one of the one or more second dielectric material sub-layers contain nitrogen implanted therein using a nitridation step.

In another embodiment, a layered dielectric structure of alternating sub-layers of a first dielectric material and a second dielectric material is formed on a suitable semiconductor substrate. In this embodiment, the layered dielectric structure comprises an alternating pattern of at least two sub-layers of a first dielectric material which is a standard-K dielectric material and at two layers of a second dielectric material which is a high-K dielectric material, wherein at least one of the one or more first dielectric material sub-layers contain nitrogen implanted therein using a nitridation step. In this embodiment, the first sub-layer (the one formed on the semiconductor substrate) in the layered dielectric structure is a standard-K material layer.